



Forming Innovative Partnerships to Enhance Future Mission-Enabling Capabilities

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Overview

- **How to partner with other world-class organizations**
 - Why seek infusion partnerships
 - How to form innovative partnerships
 - Tapping into the unusual suspects
 - **Case Study:** Partnership with Carnegie Mellon University's (CMU's) Robotics Institute





Innovative Partnerships Program

- **Facilitator**

- Bring parties together (inside and outside NASA)
- Bridge communication gaps

- **Catalyst**

- Implement new things = Change agent
- Create new partnerships
- Demonstrate new approaches and methods

- **How do we approach an issue?**

- Identify ways to add value to Agency priorities and objectives
- Win-Win-Win
 - NASA–partner–taxpayer/public good





IPP and Innovative Partnerships

Our business practices include:

- **Evaluating NASA needs and technologies**
- **Finding partners/licensees**
- **Negotiating partnership and other agreements**
- **Publicizing successes**

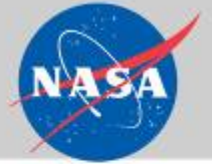




What Is Infusion?

- **Technology incorporated into NASA systems (i.e., missions)**
- **Technology used in “trade space” (where alternatives are examined)**
 - Even if a tech is not adopted, the knowledge gained was beneficial for a better understanding of tech’s capabilities and applications
- **Technology applied to NASA programs/projects**
 - Improving technical performance, cost, or schedule
 - Could be hardware, software, or knowledge.





An Innovative Path to Infusion

- **Match NASA needs with NASA technology resources (transfer across)**
 - IPP New Technology Report (NTR) database
 - SBIR/STTR programs
 - Cross-Center Software Release
- **Match NASA needs with external organizations' technology (transfer in)**
 - Other government agencies
 - Industry
 - academia





Infusion Partnership Benefits

- Leverage resources
- Expand opportunities for informed decisions on technological solutions
- Cost efficient R&D
- Accelerates technology maturation
- Increased return on R&D

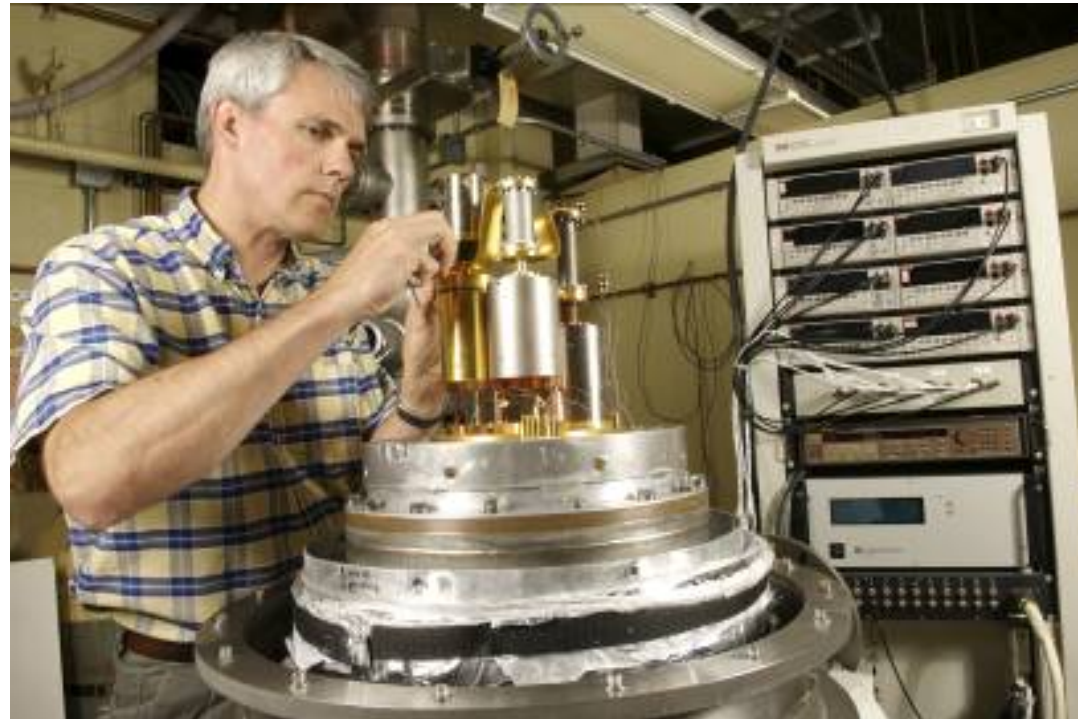
IPP's Manner of Effecting Infusion





Infusion Partnership Benefits

- *Example: Partnership with Lake Shore Cryotronics*





"Open Innovation"

- One of the best infusion practices at NASA
- Based on *Open Innovation: The New Imperative for Creating and Profiting from Technology*
 - Dr. Henry W. Chesbrough, UC–Berkeley
 - Boston: Harvard Business School Press, 2003

"Open innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively. [This paradigm] assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as they look to advance their technology."

Henry Chesbrough, 2006

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<http://ipp.gsfc.nasa.gov>





Why Innovative Partners

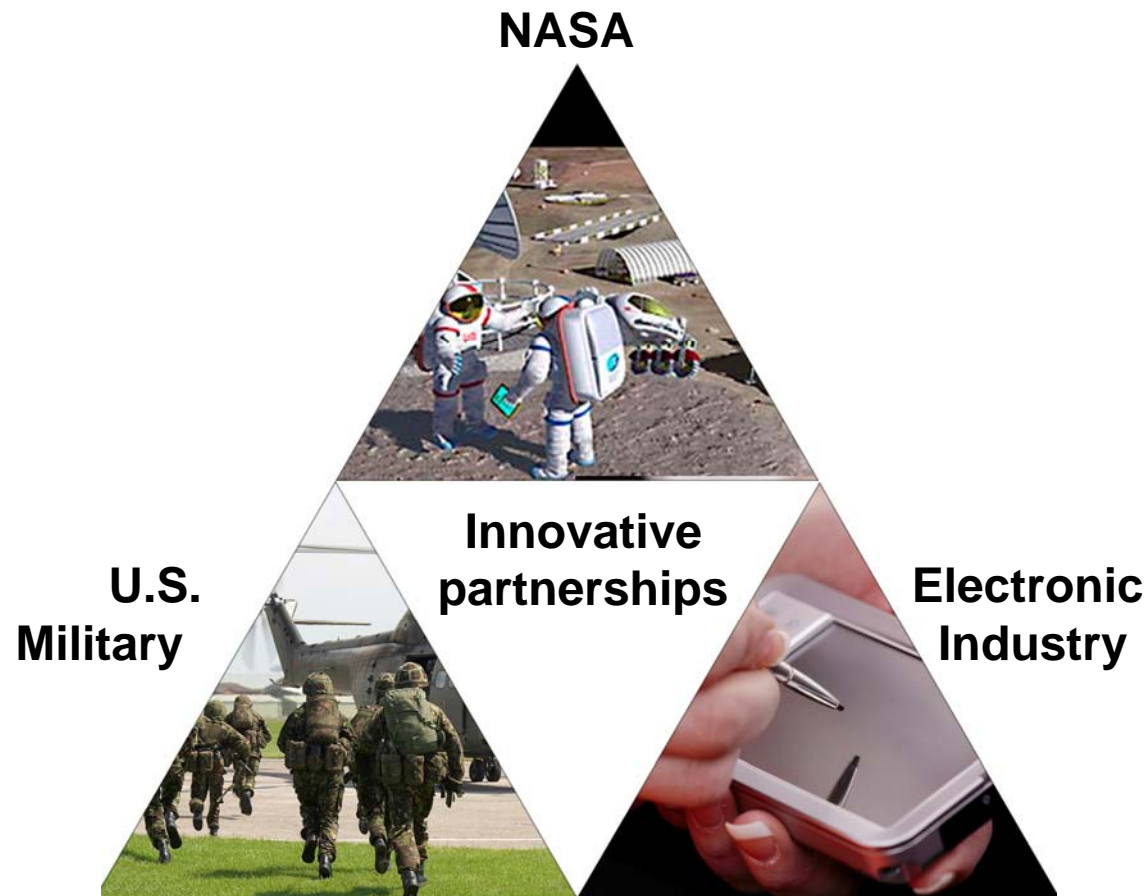
- Look to the unusual suspects
 - Those that might not immediately recognize that they have something to offer NASA and vice versa





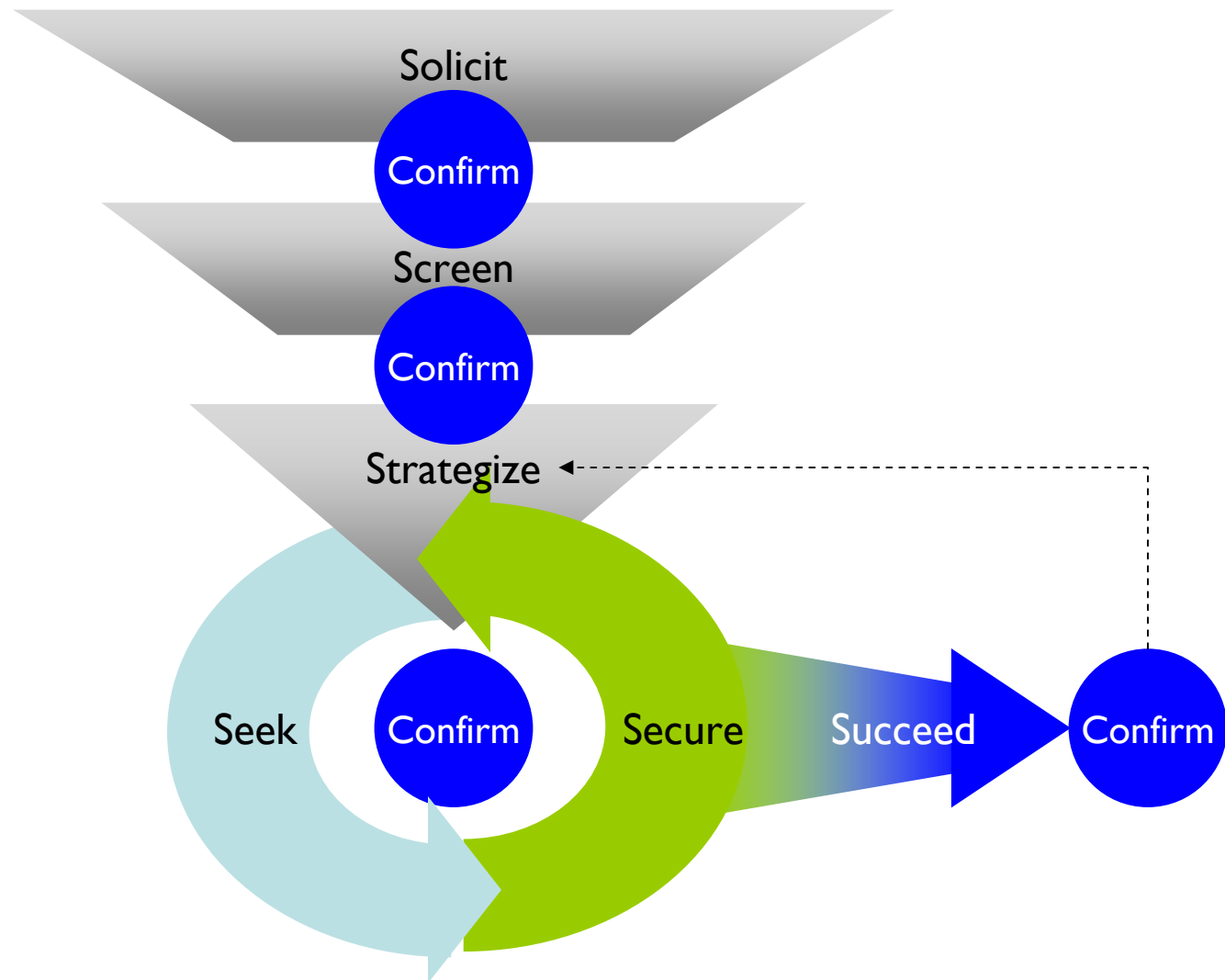
Why Innovative Partners

- *Example: NASA's need for low-mass, low-volume power sources*





Forming Innovative Partnerships





Understanding 6S: A Case Study

- Partnership between NASA and CMU's Robotics Institute



Photo credit: Gregg Podnar, CMU





1. Solicit Technology Needs

- **Interview key technologists and project leaders to understand the need**
 - Project the need will impact
 - Definition of need
 - Importance to project
 - Timeline to start/finish
 - Potential partners
 - Internal/External efforts
 - Core capabilities/competencies
 - Key intellectual property (IP)
 - Impact of fulfilling need on market
 - Impact of fulfilling need on other NASA projects





1. Solicit Needs: *CMU Case Study*

- **IPP Office conducting interviews with key personnel**
 - Leading Goddard's strategic technology efforts
- **Broad needs that the various divisions**
 - Information systems
 - Electrical systems
 - Mechanical systems
- **Used questionnaire/guide to “harvest needs”**
 - Identify all areas where technologists wanted to augment capabilities





2. Screen to Prioritize Needs

- **Down-select needs**
 - Not all needs best solved through partnership
- **Prioritization parameters**
 - Importance to NASA
 - Urgency for NASA
 - Broad applicability within NASA
 - Clarity of need's scope
 - “Fit” with non-aerospace applications





2. Screen Needs: *CMU Case Study*

- **Consulted with Chief Technologist for top need areas**
 - ID those needs harvested from technologists that were aligned with strategic focus
- **Prioritized against key criteria**
 - See parameters on previous slide
- **Identified top need area**
 - Robotic and other sensor webs
 - Couple a robotics partner with Goddard's software development, sensors, and instrumentation capabilities
 - ***Result/Goal:*** To further a sensor web system for future lunar exploration





3. Strategize

- **Key questions to identify best approach to address high-priority needs**
 - Does needed technology already exist?
 - Is it likely that a government partner can be found?
 - What types of contacts should we target? How to approach them?
 - What contacts can be leveraged?
 - What industry experts could accelerate progress?
 - What types of print/electronic materials should be used to communicate “need opportunity”?





3. Strategize: *CMU Case Study*

- **Worked closely with Assistant Chief for Information Systems Technology**
 - Identify organizations that would complement Goddard's strengths
- **Reviewed various information sources to identify potential partners**
 - Market studies
 - Patent activity
 - Publications
 - Relevant industry meetings
- **Determined best approach for these potential partners**





4: Seek Out Potential Partners

- **Marketing materials**
 - Appropriate level of detail – *not too much*
 - Use technical writers with marketing background
 - Use terminology understood/recognized by the potential partners (avoid “NASA speak”)
 - Have relevant technologists review for accuracy and clarity
- **Don't forget what NASA has to offer**
 - Include info about relevant NASA technology
 - Can be a catalyst/incentive to partnering with NASA





4. Seek Partners: *CMU Case Study*

- **Developed a “needs brochure” for national robotics conference**
 - Followed up with contacts made at meeting
- **Followed up on CMU suggestion**
 - Leveraged industry and university contacts
 - Met with Assistant Provost (Robotics Institute intro)
 - Developed matrix of CMU research vs. GSFC interests (identify overlap)
 - Present GSFC partnering interests to CMU
 - Helped GSFC researchers “sell” their message
 - One-on-one meetings with faculty of greatest interest to GSFC





5. Secure Win-Win Partnership

- “Navigate” specifics of partnership agreement
- Identify best agreement structure/vehicle
- **Negotiate mutually beneficial terms**
 - Increased commitment to the partnership
 - Increased odds for successful infusion
 - Goddard/NASA applications
 - Other non-NASA applications





5. Secure: *CMU Case Study*

- **Reconnect with relevant faculty**
 - Explore partnering opportunities
 - Partnership feasibility given funding requirements
- **Identified match with CMU group**
- **Identified potential funding opportunity**
- **Helped NASA personnel and CMU group develop joint submission**
 - Formulate collaboration
 - Kept progress from becoming “stalled” at obstacles
- **Funding won, put agreements in place**
 - Software usage agreements to protect NASA IP





6. Succeed: Observe and Promote

- Signed agreement is not the end
- Observe/Monitor to watch for—and solve—obstacles before insurmountable
- Promote to help build interest in the collaboration results
- Manage IP issues as new technologies emerge





6. Succeed: *CMU Case Study*

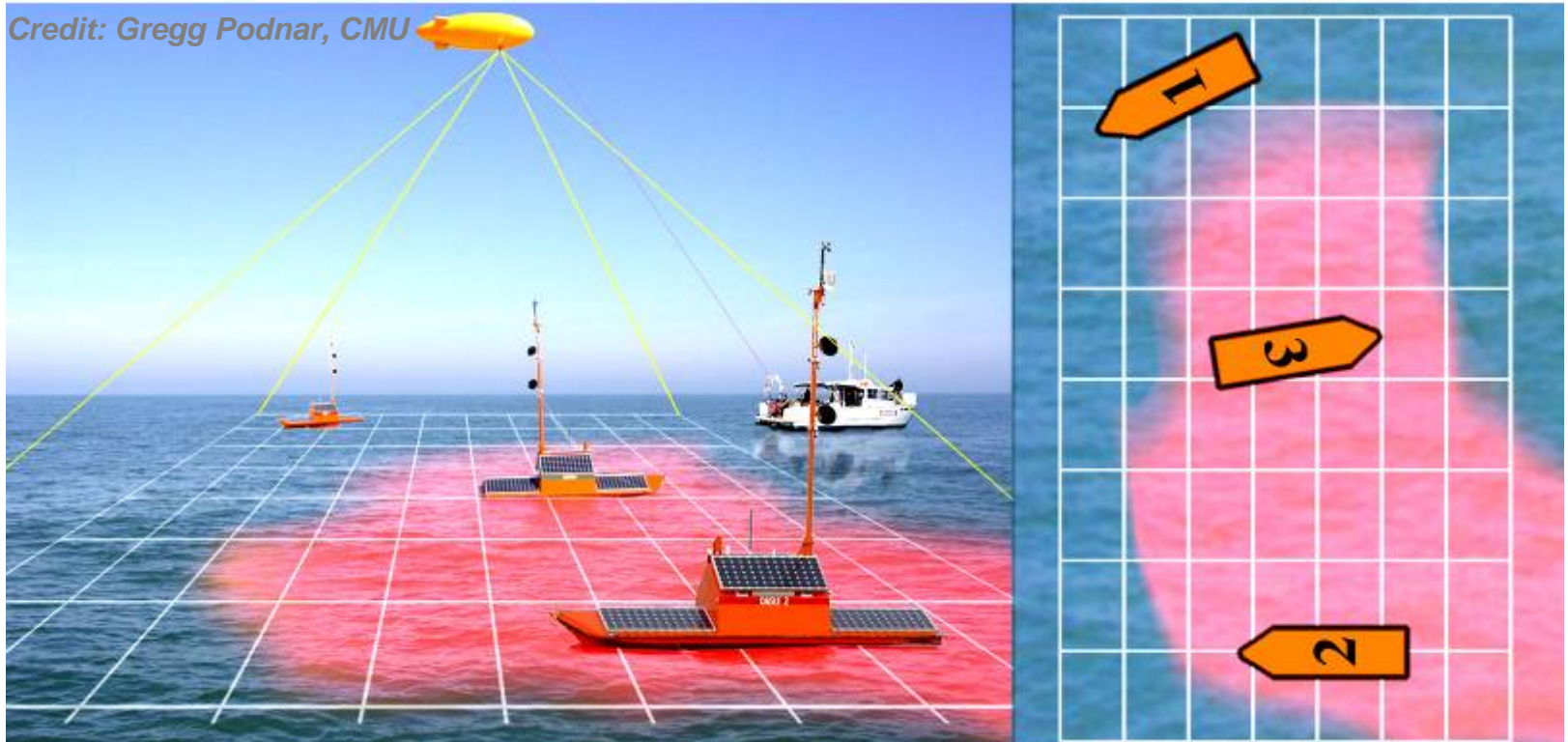
- **Contact all partners regularly**
 - Monitor progress
 - Resolve any issues
- **Notify partners of relevant funding opportunities**
 - Support project expansion and/or future continuation
 - Larger benefit to both NASA and partner
- **Feature partnership in various publications**
 - Generates additional interest in NASA/GSFC technology
 - Additional opportunities for infusion and/or spin-out for NASA





Results: A Successful Partnership

- **Development of a telesupervised adaptive sensor system for remote platforms**
 - Adaptive changes in goals, tasks, and movements
 - ESTO project: Autonomous monitoring of toxic algae blooms in Chesapeake Bay estuary





Results: Future Possibilities

- **Numerous applications for NASA's mobile, stationary, and mixed-mode networks of sensors and actuators**
 - Lunar, orbital, or planetary construction and inspection
 - Lunar and planetary in-situ resource utilization
 - Prospecting, mining, transport, and construction
- **Non-NASA applications**
 - Environmental and ecological uses
 - Homeland security
 - Military





For More Information

- **NASA Goddard Innovative Partnership Program Office**
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